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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/821,376	04/08/2004	Albert E. Cosand	M-15332 US	1607
7590 05/09/2005			EXAMINER	
Jon W. Hallman MacPHERSON KWOK CHEN & HEID LLP Suite 210 2402 Michelson Drive Irvine, CA 92612			WAMSLEY, PATRICK G	
			ART UNIT	PAPER NUMBER
			2819	

DATE MAILED: 05/09/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

## Office Action Summary

Application No.

10/821,376

Applicant(s)

COSAND, ALBERT E.

Examiner

Patrick G. Wamsley

Art Unit

2819

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☐ Responsive to communication(s) filed on \_\_\_\_.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-20 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 14 and 15 is/are allowed.
- 6) ☒ Claim(s) 1, 3-8, 16 is/are rejected.
- 7) ☒ Claim(s) 2, 9-13 and 17-20 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 08 April 2004 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
  - ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_.
  - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)  | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. ____. |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                                   | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)             |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date ____. | 6) <input type="checkbox"/> Other: ____.  |

## **DETAILED ACTION**

### ***Drawings***

Figure 1 should be designated by a legend such as --Prior Art-- because only that which is old is illustrated. See MPEP § 608.02(g).

Corrected drawings in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. The replacement sheet(s) should be labeled "Replacement Sheet" in the page header (as per 37 CFR 1.84(c)) so as not to obstruct any portion of the drawing figures. If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

### ***Specification***

The specification has not been checked to the extent necessary to determine the presence of all possible minor errors. Applicant's cooperation is requested in correcting any errors of which applicant may become aware in the specification.

### ***Claim Objections***

Claim 17 is objected to because of the following informalities:

Claim 17, line 1: Change "of claim 17" to -- of claim 16 --.

Appropriate correction is required.

### ***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1, 3, 4, 5, 6, 7, 8, and 16 are rejected under 35 U.S.C. 103(a) as being unpatentable over the Admitted Prior Art, hereafter APA, in view of U.S. Patent 5,489,904 to Hadidi, hereafter Hadidi.

As depicted in Figure 1, APA discloses a conventional subranging [Page 1, lines 22-23] analog to digital converter [100], hereafter ADC, comprising a sample and hold circuit configured to sample an input voltage [ $V_{IN}$ ] by charging a capacitor [C] through a switch; a coarse ADC configured to provide a coarse output [110]; a DAC configured to convert the coarse output [110] into an analog voltage [120]; means [130] for determining a residual voltage equaling the difference between the analog voltage [120] and the voltage on the charged capacitor [C]; and a fine ADC configured to convert the residual voltage into a fine output [140]. Unlike claim 1, APA lacks a voltage-to-current converter.

As depicted in Figure 1, APA discloses a conventional subranging [Page 1, lines 22-23] analog to digital converter [100], hereafter ADC, comprising a sample and hold circuit configured to sample an input voltage [ $V_{IN}$ ] by charging a capacitor [C] through a switch; a first stage having a coarse ADC configured to provide a coarse output [110] and a DAC configured to convert the coarse output [110] into an analog voltage [120]; and a second stage including a fine ADC configured to provide a fine output [140]. Unlike claim 1, APA lacks a second sample and hold circuit.

In contrast, Hadidi provides an improved subranging circuit using two sets of differential input pairs [abstract, line 10] and transconductance circuits [56 / 64]. In combination with APA, these devices would have served as sample-and-hold circuits for MSBs [52] and LSBs [60], functionally equivalent to the recited coarse and fine sections. Basically, they would operate in a manner similar to APA's sample-and-hold switches.

At the time of the invention, it would have been obvious to one of ordinary skill in the art to have applied Hadidi's transconductance teachings to APA's ADC. The motivation would have been to reduce the complexity of the circuit [col. 3, lines 19-23].

For claims 3 and 5, Hadidi's differential pairs serve as current switches.

For claims 4 and 6, Hadidi provides two transconductance circuits [56 / 64], operable to convert input voltages into currents switched by the differential pairs.

For claim 7, the transconductance of one pair of differential input transistors is scaled relative to the transconductance of the other pair [col. 4, lines 30-32].

For claim 8, while Hadidi's drawings depict MOS transistors, Hadidi's specification also discloses a bipolar implementation [col. 10, lines 30-33].

#### ***Allowable Subject Matter***

Claims 14 and 15 are allowed.

Claims 2, 9-13, and 17-20 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

The following is a statement of reasons for the indication of allowable subject matter: the references of record neither reveal nor render obvious the recited combination including the use of three capacitors in the claimed configuration in a subranging ADC having coarse and fine sections.

#### ***Conclusion***

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

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U.S. Patent 6,583,747 to van der Goes et al discloses a subranging ADC having coarse [C<sub>1</sub>] and fine [C<sub>2</sub>] capacitors. U.S. Patent 6,580,383 to Devendorf et al presents an oversampled subranging ADC. U.S. Patent 5,353,027 to Vorenkamp provides a multistep ADC having coarse [2] and fine [5] sections. U.S. Patent 5,302,869 to Hosotani et al shows a subranging ADC having coarse [30] and fine [31] sections coupled by capacitors [34 / 35]. U.S. Patent 4,733,217 to Dingwall shows a subranging ADC having three sample and hold circuits.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Patrick G. Wamsley whose telephone number is (571) 272-1814. The official facsimile number is (703) 872-9306. An alternate facsimile number, (571) 273-1814, should only be used for unofficial documents.



*Patrick G. Wamsley*

*May 4, 2005*